cc: Leslie
Task: 4435

Form MR-REV-att (DOGM – Revise/Amend Change Form)
(Revised September 14, 2005)

Application for Mineral Mine Plan Revision or Amendment

Operator: Red Leaf Resources

Mine Name: Southwest #1 **File Number:** M/ 047 /0103

Provide a detailed listing of all changes to the mining and reclamation plan that will be required as a result of this change. Individually list all maps and drawings that are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise or amend the existing Mining and Reclamation Plan. **Include page, section and drawing numbers as part of the description.**

DETAILED SCHEDULE OF CHANGES TO THE MINING AND RECLAMATION PLAN

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	Page 6 updated to reflect current status for contiguous leases
☐ ADD	☒ REPLACE	☐ REMOVE	Page 18 added paragraph (2nd full)
☐ ADD	☒ REPLACE	☐ REMOVE	Page 19 updated for easement approval
☐ ADD	☒ REPLACE	☐ REMOVE	Page 27 corrected typo 2nd row; middle column (90 changed to 9.0)
☐ ADD	☒ REPLACE	☐ REMOVE	Page 43 updated for Graham's penstemon
☐ ADD	☒ REPLACE	☐ REMOVE	Page 46 updated for sage grouse
☐ ADD	☒ REPLACE	☐ REMOVE	Page 53 updated for cultural resources
☐ ADD	☒ REPLACE	☐ REMOVE	Page 54 updated to clarify well abandonment plugging & reclamation
☐ ADD	☒ REPLACE	☐ REMOVE	Page 55 updated to denote ground preparation for seeding
☐ ADD	☒ REPLACE	☐ REMOVE	Page 58 updated table to consolidate Shadscale seed mix (2 rows → 1 row)
☐ ADD	☒ REPLACE	☐ REMOVE	Appendix K updated water strategy
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments and obligations, herein.

JAMES W. PATTEN
Print Name

James W Patten
Sign Name, Position
President/CEO
10/6/2011
Date

Return to:

State of Utah
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Division of Oil, Gas and Mining
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Bond Adjustment: from ($)
to $

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DIV. OF OIL, GAS & MINING

Dr. Laura Nelson, VP Energy and Environmental Development: Address same as above. Email: lnelson@redleafinc.com

5. **Location of Operation**: Uinta Basin, Utah. School and Institutional Trust Lands ML 50150 (T13S R23E S19: LOTS 1(36.75), 2(36.85), 3(36.95), 4(37.05), W2NE4NE4, W2SE4NE4NE4, W2NE4, W2NE4SE4NE4, W2SE4NE4, SE4SE4NE4, E2W2, SE4 [LOTS AKA W2W2; T13S R23E S20: SW4SW4NW4SW4, W2W2SW4SW4 ; T13S R23E S29: NW4NW4NW4, S2NW4NW4, SW4NW4; and T13S R23E S30: LOTS 1(37.12), 2(37.15), 3(37.19), 4(37.22), E2, E2W2 [ALL] and 43374 (T13S R 22E S36:W2NE4, NW4, N2SW4) (**See FIGURE 1:** Vicinity and General Layout Map)

6. **Ownership of Surface**: SITLA owns the majority of surface rights within Red Leaf's proposed area of operations. SITLA's address is 675 East 500 So. Suite 500 Salt Lake City, UT 84102. Alameda Corporation owns a private property right to 40 acres of surface within Section 19 (SW ¼ of NE ¼ Section 19 Township 13 S Range 23 E). Alameda's address is PO Box 22608 Houston, TX 77227. Red Leaf will work with Alameda corporation accordingly to acquire rights for use of the surface on the in-holding through mining operations and completion of reclamation (See **APPENDIX G**: Property Survey.)

7. **Ownership of Minerals to be Mined**: School and Institutional Trust Lands Administration (Royalty) See address above

8. **Contiguous Lessees**

Additional leases within Township 13 South, Range 23 East, Section 19 include oil and gas leases issued to Questar by SITLA (ML 49774 and ML 49398). Within Township 13 South, Range 23 East, Section 30, leases have also been granted for oil and gas and grazing to Questar (ML 49398) and Alameda Corp (GP 20595), respectively. ML 49398 also includes Section 20 in Township 13 South, Range 23 East. GP 20595 also includes Section 29 in Township 13 South, Range 23 East.

EDITED FIRST SENTENCE

ADDED LAST TWO SENTENCES OF PARAGRAPH

With the exception of pit endwalls and the final highwall in each of the two lease parcels, the final configuration of the stacked capsules represents the topographic surface that will require grading. The capsules are also expected to subside (settle) as the oil is removed. After the heaters have been removed from each capsule, a cooling period will be allowed. After cooling and settling is completed, the capsules will be ready for regrading and final reclamation.

Final capsule configuration is an important aspect of the project. Prior to regrading, the initial Type 1 and Type 2 capsules will be equipped with monitoring instrumentation so that important parameters such as BAS performance can be evaluated. Additionally, external features such as settling of the capsule outside surfaces will be monitored once the first Type 1 and Type 2 capsules are constructed, and also following heating, extraction of product, and cooling. The graded pit floor, which slopes mildly at about 3% to the north and east, will serve as the base elevation of the constructed capsules. The pre- and post-heating dimensions will be surveyed so that plan view dimensions as well as cross sectional dimensions of the initial capsules can be documented. The placement of suitable overburden material prior to placement of suitable plant growth material has been incorporated into the design of the final surface. Monitoring data will be used to update material balance calculations and final drainage designs if necessary.

ADDED NEW PARAGRAPH

Final grading to achieve acceptable surface contours for positive drainage will be completed using overburden material and if necessary, unconsolidated material above the overburden that can be used as suitable plant growth material. Regional geologic investigations and results of the soil survey completed for the site do not show any significant volume of deleterious material requiring special handling of backfilled material. Salvaged soil will then be used for suitable plant growth material to cover the final graded capsule.

From the heated ore zone, the top of the capsule surface will be covered with approximately 13 ft. of gravel insulation, a 3 ft. layer of BAS which will prevent moisture from entering the capsules and hydrocarbons from escaping the capsules, and 1 to 2 ft. of regraded overburden to account for settling. Regraded overburden thickness will be increased on the edges of the capsules from 1 to 2 ft. to approximately 6 ft. to accommodate settling near the vertical segment of the BAS wall (**FIGURE 7**). Finally, the capsules will be covered with approximately 12 inches (in.) of suitable plant growth material. The overall regraded topography of the stacked capsule surface will have positive drainage from the site. (**See APPENDIX E--**Operations and Reclamation Drainage Design Plan) However, the final top surface of the capsules will be regraded in some areas to reduce run-off onto the sideslopes and minimize erosion potential. Small areas will be left with a concave surface to collect surface intercepted precipitation and encourage establishment of more mesic vegetation communities and reduce run-off. Given the limited precipitation in the area and high evapo-transportation rates for the area, puddling of moisture is not anticipated to last for extended periods of time. Given a total thickness of cover material of approximately 20 to 24 ft., puddled water will not enter the hydrocarbon recovery zone of the capsules. By managing the relatively flat top surfaces of the capsules in this manner, run-off from the top surface to the sideslopes will be limited (**See APPENDIX E**).

The sideslopes of the capsules will consist of backfilled overburden constructed and compacted in shallow lifts to provide support to the BAS layer on the capsule sidewalls. Backfilled

sideslopes of the capsules are anticipated to be approximately 1.5H:1V, with a small terrace, used as a ramp during capsule construction, remaining between the bottom tier and top tier of capsules. The BAS walls in both the bottom and top capsules will be approximately 79 ft. tall. The total height of the stacked capsules will be approximately 194 ft. prior to the addition of approximately 6 in. of suitable plant growth material.

The postmine topography for the site is provided on **FIGURE 4**, and corresponding cross-sections that show both the highwall and endwalls, and the north-south and east-west profiles are provided on **FIGURE 5**. Reclaimed drainages will tie in to the adjacent undisturbed area within the lease boundary. The Drainage Control Plan for the site is provided as **APPENDIX E**.

Reclamation

All disturbed areas will be regraded to a stable configuration and planted with different seed mixes suited for the different slopes, aspects and topographic positions established in the regrading plan. Details of the reclamation plan are provided in **Section 106.110.5.**

Transportation and Access

Transportation to and from the site will occur predominantly along Reservoir Canyon Road which runs off of Seep Ridge Road. Additionally, other county roads and "new" roads will provide direct access to areas planned for active mining, with a road constructed across T 22S R13 E S 25 to provide access between the lease properties (See **FIGURE 1**). An easement has been granted by SITLA for construction of this road (ESMT #1622). The design of the road is included as **APPENDIX H**--Road Plan and Profile. The Easement Application is provided as **APPENDIX H.1**.

UPDATED SENTENCE FOR EASEMENT

82	Gompers very channery silt loam, 25 to 50 percent slopes	0 in.-22 in.	22	About 1.5 percent (low)	7.9 to 9.0	To 40%	0	0	Well drained
263	Walknolls-Mikim association, 2 to 50 percent slopes	0 in.-22 in. 0 in.-60 in.	363	About 1.5 percent (low) to About 4.5 percent (moderate)	7.9 to 9.0	To 30%	0	0 - 2.0	Well drained
270	Whitesage-Cedarknoll complex, 3 to 8 percent slopes	0 in.-60 in. 19 in.-22 in.	1,061	About 1.5 percent (low)	7.9 to 9.0	To 40%	0	0 - 2.0	Moderately low

EDITED THE 9.0

[1] see http://www.ut.nrcs.usda.gov/technical/technology/range/mlra34b.html

Map Unit: 81: Gompers very channery silt loam, 4 to 25 percent slopes

The Gompers component makes up 85 percent of the map unit. This soil typically occurs on slopes and hills of 4 to 25 percent between 6,500 and 7,100 feet elevation in the 12 to 16 inch precipitation zone. The parent material consists of slope alluvium over residuum derived from shale. The Gompers series has no B horizon; the A horizon is thin, platy and somewhat blocky. The surface horizon is brown to yellowish brown (10YR).

Depth to a root restrictive layer, typically lithic bedrock, is 8 to 20 inches. The natural drainage class is well drained and has a high runoff potential. Water movement in the most restrictive

NEW PAGE

109.2 Plant and Wildlife Habitats and Endangered Species

Plants

Special Status Plants

Graham's penstemon *(Penstemon grahamii)* was proposed for listing as a Threatened species under the Federal Endangered Species Act of 1973 (ESA) in 1975, 1990, and 2002. In 2006 it was removed from consideration for listing. On June 9, 2011 in response to a lawsuit it was again fomally proposed for listing as Threatened (FR 2006). White River penstemon *(Penstemon scariousus* var. *albifluvis)* has been a Candidate for listing since 2004 (USFWS 2010).

Under the ESA, plants are protected on federal lands. Protection on state or private lands is afforded only if federal funds or permits are involved, if there is a state endangered species act that protects the species, or if there is a Conservation Agreement (CA) or similar document in place stating protection will be provided (USFS 1997). A CA was developed for the Graham's beardtongue and signed by USFWS, BLM, and Utah Department of Natural Resources (DNR), but was not signed by SITLA or Uintah County. There is no CA for the White River penstemon. Because SITLA was not a signatory of the CA, actions on SITLA land may arguably not be subject to the federal Endangered Species Act of 1973. Nevertheless, because DNR has signed the CA, Red Leaf commits to working with DOGM and other cooperating entities in support of their efforts to study and assess the potential for avoidance or mitigation of impacts to Graham's penstemon on its leases.

Although no individuals of either species were noted in two overview surveys in the southern half of Section 30 of this project (a full-blown survey was not completed – see memo in **APPENDIX C**) , data available through USFWS indicates that Graham's penstemon has been found on the project area. It has not been confirmed that White River penstemon grows within the project area boundaries.

RLR commits to protecting populations of these plant species when their protection does not significantly affect direct mining activities. For example, the locations of "associated disturbances", such as haul roads, overburden stockpiles, or staging areas, will be adjusted whenever possible from the originally surveyed location to avoid disturbing these species. While most of the land surface will eventually be disturbed by mining, RLR recognizes the need for preservation of habitat to the maximum possible extent until such time as soil pre-stripping and overburden removal are scheduled to begin. RLR commits to surveying for these species within one year of disturbances planned within the areas with potential habitat during the plants' blooming period, to identify living populations. Whenever feasible, a buffer of up to 300 foot between proposed disturbance and living plant populations will be maintained. Individual populations will be marked with flagging, GPS'd, and cordoned off to prevent inadvertent disturbance to the plants. In addition, RLR will cooperate with DOGM and its cooperating partners in applying reasonable mitigation measures identified by the participants in the CA and affiliated entities.

Greater Sage Grouse – Based on information from the Utah Conservation Data Center and the Utah Automated Geographic Reference Center (AGRC) (UCDC 2010), no leks exist within the lease area. All of the lease area is within SG brood rearing habitat, which covers most of the souther third of Uintah County, of which the project area is a small part. Although lek areas have time and distance avaoidance requirements, brood-rearing habitats do not (See APPENDIX P). The last record of observation in the area was on April 4, 2008.

Sage grouse inhabit sagebrush plains, foothills, and mountain valleys. All SG habitat must contain sagebrush as the bird uses this plant for cover and food, although grasses, forbs, and associated wet meadow areas are also essential for good habitat. Male sage-grouse gather on traditional open areas called "leks" during March and April for courtship, which involves displaying their feathers and making booming calls from inflated air sacs at their throats. Females visit the leks during the first part of April, after which they nest in mature stands of sagebrush.

Sage-grouse numbers are declining in Utah due to loss of habitat caused by several factors including spraying of sagebrush, conversion of sagebrush lands to cropland, and over-grazing of mountain meadows by livestock. Greater Sage-Grouse are native to Utah and are listed as a Candidate species by the US Fish and Wildlife Service (UCDC 2010).

RLR will mitigate brood rearing habitat loss by (1) including sagebrush in the reclamation seed mix, (2) reclaiming the mine and processing cells to a flat to undulating topography with small swales that will mimic favorable Sage Grouse nesting areas, and (3) leaving in place five ponds that will provide water and riparian habitat that is important to young Sage Grouse. Elimination of the pinyon-juniper dominated habitats that preclude growth of sagebrush may result in improved brood rearing habitat after reclamation.

ADDED LAST SENTENCE OF PARAGRAPH

109.3: Projected Impacts of Mining Operations on Soil Resources

Existing soil types in the Study Area are described in **Section 106.5** above with a more detailed characterization found in **APPENDIX C**. Mining will affect approximately 783 acres during

109.5: Actions to Mitigate any Referenced Impacts

There are no anticipated significant impacts referenced above.

Cultural/Historic Resources

Red Leaf has completed cultural resources inventories for the 2 SITLA lease parcels and rights of way corridors on adjacent SITLA lands. The cultural resources report has been submitted to SITLA and the State Historic Preservation Officer (SHPO) for review, comment and approval. The Executive Summary of the Cultural Resources Report is provided as **APPENDIX L.** All appropriate consultation with the SITLA archeologist required or appropriate has been carried out by Red Leaf's consulting archeologists. Three cultural resource sites identified within the boundaries of ML50150 are recommended for inclusion in the National Historic Register. These sites will be avoided or mitigated in consultation with the SITLA archaeologist prior to disturbance. Should additional cultural resources be encountered during mining, work in the area will be stopped immediately and the SITLA archaeologist notified.

UPDATED PARAGRAPH ADDING LAST 2 SENTENCES

R647-4-110 Reclamation Plan

110.1: Current Land Use and Post Mining Land Use

The current land use for the area is limited mining activity surrounded by grazing and wildlife habitat.

The reclaimed lands will be grazing and wildlife habitat.

110.2: Reclamation of Roads, Highwalls, Slopes, Dumps, Etc.

With the exception of small roads retained to access the site, all project related roads will be reclaimed at the first appropriate time. Seeding will take place between October 1 and January 30, with Fall seeding preferable. Consistent with the findings of the Stability Analysis in APPENDIX D, during mining highwalls and pit endwalls may be as steep as 53 degrees. However, after mining is completed, all highwalls and endwalls around the perimeter of mined areas will be regraded to not exceed 45 degrees as required by rule. The top surface of capsules

will be regraded to a relatively flat surface with sufficient grade to maintain drainage. Final capsule side slopes located inside the mined out area of the site will be regraded to approximately 1.5H:1V slopes with a FOS of 1.25 or greater as supported by a geotechnical analysis (APPENDIX I). All stockpiled overburden will be used to cover the capsules and other disturbed areas as part of the regrading plan. Additional details of the regrading plan are provided in section 106.2-Final Grading and shown on the postmining topography map and corresponding cross sections of the regrading plan (**FIGURE 4** and **FIGURE 5**, respectively).

Following the completion of mining, five reclamation ponds will remain in a stable configuration to contain runoff waters and to beneficially provide water for stock and wildlife for the post-mining land use. Two in-pit ponds (Ponds 4 and 5) have been included at the northeast corner of the two mining areas. These two ponds will be left as excavated areas and water will naturally collect there. The adjacent highwall will be protected by a toe berm constructed with materials excavated for the ponds, to ensure long-term stability of the ponds and the adjacent highwalls. The crest of the berms will be 5 feet above the modeled 100-year 60-day storm event of 6.17". The emergency spillway of the ponds outside the pit will be sized to safely pass the 100-year 24-hour storm event.

110.3: Surface Facilities to be Left

If requested by the post mining land owner SITLA, or through determinations of future water needs for Red Leaf operations, water well(s) may be left at the site. If SITLA does not request water wells to be left on-site, the wells will be plugged and abandoned of in accordance with Division of Water Rights and DOGM plugging rules. In this case, with the exception of foundations associated with structures and end-pit ponds 4 and 5, all facilities will be removed from the site at the time of closure. It is anticipated that only subsurface foundations will be decommissioned in place.

MODIFIED PARAGRAPH BY ADDING SECOND SENTENCE

Any foundations left at the site will be fractured and covered with an adequate amount of suitable cover so that the area can be revegetated.

110.4: Treatment, Location and Disposition of Deleterious Material

Based upon the exploration program, geology of the area and the soil survey conducted for the site, the dominate rock type is marlstone which is common to the region. Although some very isolated "stringers" of high sulfur and potentially pyritic material may be present, marlstone has a high carbonate content, which provides an excess of neutralizing capacity in the event of acid generation caused by the oxidation of pyrite.

110.5: Revegetation Planting Program and Topsoil Redistribution

Utilizing all material from the project area, the goal of the reclamation plan is to establish a stable final topography vegetated with perennial species adapted to the site that support the postmining land use and minimize erosion onto adjacent lands. Pit highwalls and endwalls will be constructed back to a stable configuration as noted above. Capsules within the pit boundaries will be regraded and revegetated. Final reclamation of the capsules will include an average application of approximately 12 inches of suitable plant growth material on top of regraded overburden on the capsules. Following the placement and scarification of suitable plant growth material, the flat surfaces, including the top and mid-slope terraced area between the bottom and top tiers of the capsules, will be seeded with a mixture of predominately native grasses, forbs and shrubs common to the area (See Seed Mixes below). All disturbed lands will be reclaimed at the first appropriate time. Seeding will take place between October 1 and January 30, with fall seeding preferable. Prior to seeding the substrate will be ripped with a harrow or similar equipment to break up compacted growth medium and improve potential for seed germination.

ADDED LAST SENTENCE OF PARAGRAPH

About one fourth of the regraded sideslopes of the capsules will be scarified or pocked, as appropriate for reclamation, using a dozer or track hoe or similar piece of equipment in an irregular pattern. This slope treatment will break or interrupt the grade of the slope, check erosion and establish topographic diversity that results in microsites conducive to establishing plant communities. Specific dimensions of pocks will be based upon the equipment used to create them on the sideslopes of the capsules. Suitable plant growth material will be tracked into these features to encourage the establishment of vegetation. These areas will then be broadcast seeded with a mixture of forbs, grasses and shrubs (See Seed Mixes below).

Replacement species for species with *

Common Name	Scientific Name	PLS[1] pounds/acre
Four wing saltbush	Atriplex canescens	2

A second mix has been developed for the more mesic capsule surfaces and other disturbed areas (**Table X**). The relatively flat capsule surfaces compose the majority of the reclaimed landscape at the project. These flatter capsule surfaces as well as other flatter slopes such as reclaimed roads and ramps will be seeded with a rangeland seeder.

Table X: Flat Capsule Surface Seed Mix

Common Name	Scientific Name	PLS[1] pounds/acre
Western wheatgrass	Pascopyrum smithii	2
Indian ricegrass	Achnatherum hymenoides	2
Siberian Wheatgrass	Agropyron fragile	2
Small burnet (Delar)*	Sanguisorba minor	0.5
Palmer's penstemon (Cedar)*	Penstemon palmeri	0.75
Shadscale	Atriplexconfertifolia	2

CONSOLIDATED SHADSCALE PLS

Appendix "K"

Executive Summary of

Water Strategy for

Red Leaf Resources

Southwest #1
LMO Application
Appendix K

Executive Summary

Red Leaf Resources, Inc. (Red Leaf) is developing a new technology to extract and produce energy fuels from naturally occurring shallow deposits of oil shale in a number of areas. In order to develop the oil shale resource, a number of support facilities will be required including a clean and reliable source of water. The water will be needed to support the initial and ongoing construction efforts, notably the clay-enclosed process capsules, equipment maintenance, dust control, and potable water for staff. The process itself requires negligible amounts of water and in fact produces water. This study evaluates the feasibility of developing surface and groundwater resources around the site as a means of supplementing the water that is generated by the process to provide the remaining water necessary for facility operations.

Anticipated Demand

Based on the current operational model, it is anticipated that an average of 107 gallons per minute of water will be needed for the operations; however, the demand will vary throughout the operation with some days requiring larger quantities of water while other days less water will be needed. The water use strategy includes assessing measures to further reduce total water demand.

Surface Water

The development of surface water falls into two potential categories: 1) diversion of streams or springs, and 2) the collection of storm water runoff across and from above the site. There are no consistent water courses across the site that would allow for consistent diversion. One off-site stream has been determined to not be a feasible alternative for the ongoing processes. However, the collection of storm water (diversion of intermittent channels) appears feasible and could net between 7 and 17 million gallons of relatively clean water per year. The variability of the runoff is also such that a backup or alternative source is recommended to ensure a continuous flow of water to the process.

Ground Water

The development of groundwater below the site also appears feasible, and is likely to provide a consistent source of high quality water. The water is generally thought to be 600 feet below the surface and the formation structure will require wells to extract the water at a sufficient rate to ensure water does not inhibit the operations. Regionally wells have been known to produce between 1 and 200 gallons per minute. A well on site produces on the order of 15 gallons per minute. At this time, Red Leaf plans include two water wells, using data from the test wells to assess future well plans.
The energy required to extract the water will be higher than required of surface water sources (on the order of 9 kWh per 1000 gallons of water). It is recommended that wells be installed and used as necessary to augment surface water supplies and not used as the sole source. The use of solar panels may be used to provide power to the well pumps depending on the capacity of the final wells. The minimum capital cost to provide solar power to the wells is estimated at $300,000 and maybe higher if battery storage is required to pump 24 hours per day.

Process-derived Water

The process of extracting petroleum liquids and gases from the oil shale also results in extraction of water that occurs naturally in the ore. This water will be removed as vapor and along with the other

gases will be condensed and recovered as part of the overall process. Process derived water will be put to use and will supply approximately one third of the total project water demand.

Water Uses

Most water will be consumed for construction of the process capsules and for dust control. The EcoShale InCapsule process itself is a net producer of water. Water used in the process operations, such as cooling water for the condensers, is reused to the maximum possible extent The reuse water stream and water extracted from the shale can be treated, stored, and used for a number of future uses. The use of process-derived water and reuse of water from process operations has the potential to reduce ongoing demand for new water once the process is underway; however, it will not help with initial startup processes. Water quality will be critical to maintaining an efficient operation while ensuring quality control. For some uses, a relatively low quality of water is acceptable, while for drinking water extremely high quality water is needed. Continual testing of the various water sources and efficacy of the treatment processes will be required to ensure the proper quality of water is available for the intended use.

Surface water alone appears to be insufficient to support the operations. The process water, while plentiful as the process develops, will not be available in substantial quantities at process initiation. Groundwater wells have the potential to provide sufficient water but well construction is costly and lifting water from the deep aquifer is energy intensive. To provide sufficient quantity and quality of water in a timely manner will require the careful coordination of a combination of water sources.

Storage

Over short durations, the water demand is likely to exceed the available production rates, and demands will most certainly occur when storm water is not available. To maximize the storm water and production water and to conserve energy associated with the operation of water wells, large quantities of stored water on site will be critical to meeting water demands. A total storage of 20 million gallons is recommended to provide capacity to capture storm water, contain process water, and meet peak demands from the facility. The most economic method to construct this required storage is to create impoundments and store water in opened, lined pits. Red Leaf presently plans to construct one on-site pond.

Conveyance

Conveying the water to and from a central storage facility(s) is key to ensuring the smooth operation of the recovery process. Typically, water can be transported in two primary methods: 1) pumping and piping, and 2) trucking. Trucking is typically an ideal solution for small quantities of water for short periods of time as this method requires little to no infrastructure, except for a storage tank to receive the water. Assuming a relatively short travel time, the most a single 4,000 gallon truck could transport would be on the order of 8,000 gallons per hour (two round trips) or 130 gpm. With operating expenses for a truck of approximately $75 per hour, the cost per gallon delivered is estimated at $9.37 per thousand gallons. The cost to pipe and pump will vary depending on the distance and the ability to utilize the duct bank. Water delivery to each source will need to be evaluated to determine the most efficient method. In general long term large uses will be best served through piping while distributed uses like dust control will be best served via trucking.

On Site Consumption

With the exception of storm water release from the proposed sediment pond during extraordinary precipitation events, all water captured, recovered, or withdrawn for use on the project will be used on

site. There will be no release of any water from the site other than storm water. Water from process operations remaining in tanks, vessels, etc. will be blended with process-derived water, which will have a very low concentration of dissolved solids, and used for dust suppression during reclamation and site closure. Blending prior to use for dust control will ensure that water with unusually high concentrations of dissolved solids is not applied even for dust control purposes.